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Experimental investigation of pervious concrete with addition of fibre

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Abstract: **Pervious concrete is one of the most promising sustainable materials. Nowadays, Pervious Concrete is a light-weight concrete produced by omitting the fines from conventional concrete also known as "No-fine Concrete" or "Porous Concrete" is a material comprised of narrowly graded coarse aggregates, cement materials, water and admixture and in some cases fibres are used. In this paper pervious concrete the fibres of sandwiched combination is used to analyze the property strength, durable, permeability of pervious concrete. The most important property of pervious concrete is its drainage facility through permeability. The use of titanium di oxide is found to enhance the permeability in pervious concrete by oxidizing the pollutants and helping in washing down the clogged particles from the pores during rainy season.**

Key words: **No-fine, Permeability, Strength**

1. INTRODUCTION

A larger amount of rainwater ends up falling on impervious surfaces such as parking lots, driveways, sidewalks, and streets rather than soaking into the soil. This creates an imbalance in the natural ecosystem and leads to a host of problems including erosion, floods, ground water level depletion and pollution of rivers, lakes, and coastal waters as rainwater rushing across pavement surfaces picks up everything from oil and grease spills to de-icing Salts and chemical fertilizers. Conventional normal weight Portland cement concrete is generally used for pavementconstruction. The impervious nature of the concrete pavements contributes to the increased water runoff into the drainage system, over-burdening the infrastructure and causing excessive flooding in built-up areas. Thus pervious concrete can play a vital role in filtration and rain water harvesting due to its porosity. This type of concrete has become significantly popular as a sustainable application during recent decades due to its potential contribution in solvingenvironmental issues.Using sufficient paste to coat and bind the aggregate particles together creates a system of highly permeable, interconnected voids that drains quickly.

II. OBJECTIVE

- To strengthen the pervious concrete using polypropylene fibre as admixture.
- To recharge the water table of soil beneath the construction.
- To increase life of structure.

III. MATERIALS

Cement:

Ordinary Portland cement (OPC) of M43 grade used for casting.

Coarse aggregate:

The coarse aggregate was natural gravel of 10mm to 20mm maximum size was used.

Polypropylenefibre:

In the study Fibrillated 12 mm cut length fibres were used. These polypropylene fibres.

IV. MIXING, CASTING AND CURING:

All concrete samples (cubes, cylinders and prisms) are casted in steel molds. They were cleaned and oiled before casting. The fresh concrete was placed inside the molds with approximately three equal layers and compacted by tamping rod. After 24 hours the specimens were demoldedand kept it in curing tank.

V. RESULT AND DISCUSSION:

A.Compressive strength

The compressive strength development for all types of mixes is presented in Figure 3& 4. Test results illustrate that in general, reference pervious concrete and polypropylene fibre pervious concrete specimens exhibited continuous development in strength up to 7 and 28 days of curing. There is a considerable improvement in strength for mixes containing fibres. There was a slight increase in the compressive strength with increasing the fibre volume fraction, unless the fibre volume is so high leading the air

voids content to become excessively high. The air voids tends to have a negative effect on the compressive strength.
While increasing the particular percentage addition of fibre the compressive strength of pervious concrete is decreasing. Up to 0.2% addition of fibre the compressive strength is increasing gradually above 0.2% the compressive strength get reduced.

Compressive strength without addition of fibre:

Curing days	Compressive strengthN/mm^2
7	5.1
28	11.2

Table 1: Result of Compressive strength without addition of fibre

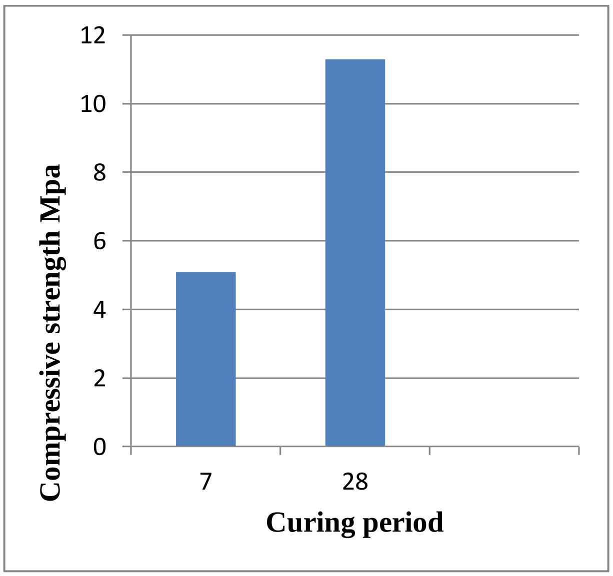

Figure No1: Compressive Strengthfor without addition of fibre

Figure No2: Compressive test on cube

Curing days	Compressive strength N/mm^2		
	0.1 %	**0.2%**	**0.3%**
7	5.3	6.11	5.4
28	11.6	14.3	13.5

Table 2: Result of pervious concrete with addition of fibres

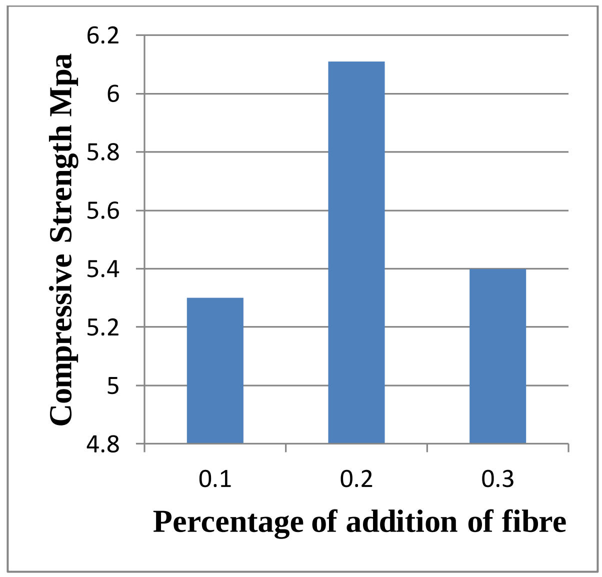

Figure No3: Compressive strength in 7days with addition of fibre

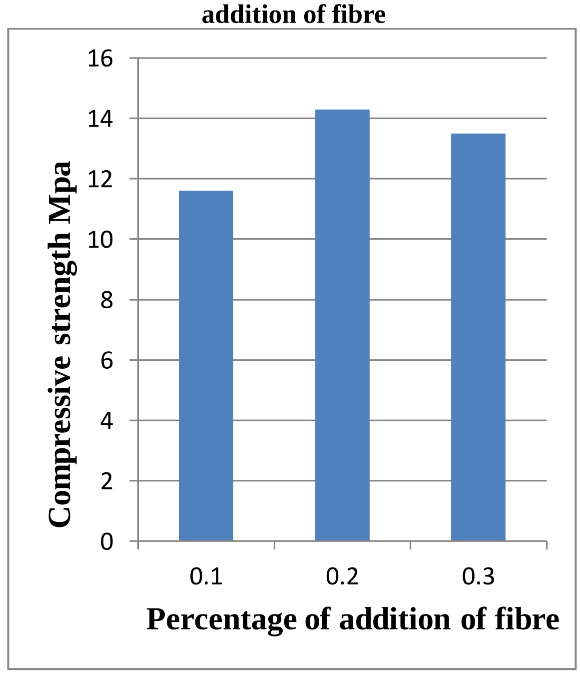

Figure No 4: Compressive strength in 28days with addition of fibre

B. Split tensile strength

Results of splitting tensile strength of reinforced fibre concrete mixes curedup to 7 and 28 days are demonstrated in **Figure 7 & 8**. The incorporation of polypropylene leads to higher splitting tensile strength compared to theircorresponding reference concrete. The tensile strength of the fibre concrete mixesincreases with the increase of fibre volume content. This is due to the nature of binding effect of fibre available in concrete matrix. The control batch specimens containing no fibre failed suddenly once the concrete cracked, while the fibre reinforced concrete specimens were still intact together. This shows that the fibre reinforced pervious concrete has the ability to absorb energy in the post- cracking state. The comparison of percentage difference in splitting tensile strength for polypropylene fibre reinforced pervious concrete to its control batch is presented below, for example thePercentageincrease in tensile strength for polypropylene mixes containing fibre by volume fraction of (0.1%, 0.2%, 0.3%).

Split tensile strength without addition of fibre:

Curing days	Tensile strengthN/mm^2
7	1.77
28	2.6

Table 3: Result of tensile strength without addition of fibre

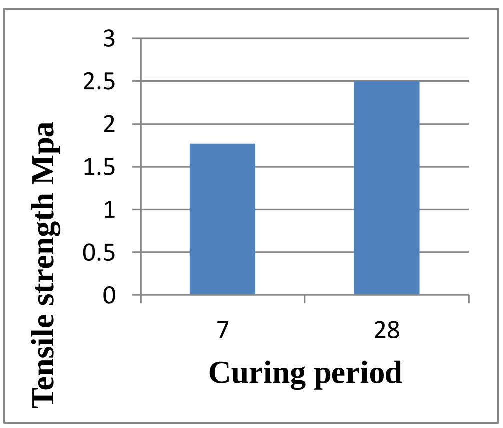

Figure No5: Tensile strength for without addition of fibre

Split tensile strength without addition of fibre

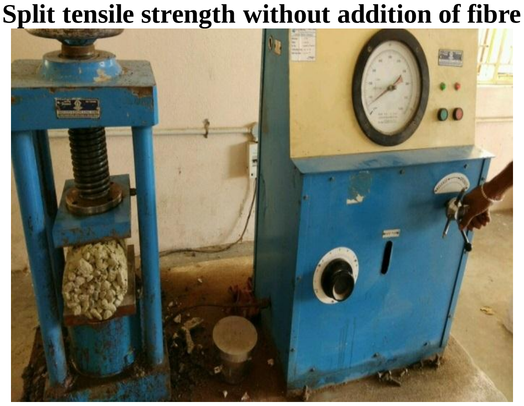

Figure No 6: Split tensile test on cylinder

Curing days	Split tensile strength N/mm^2		
	0.1 %	**0.2%**	**0.3%**
7	3.68	4.1	4.65
28	4.72	5.3	5.7

Table 4: Result of pervious concrete with addition of fibres

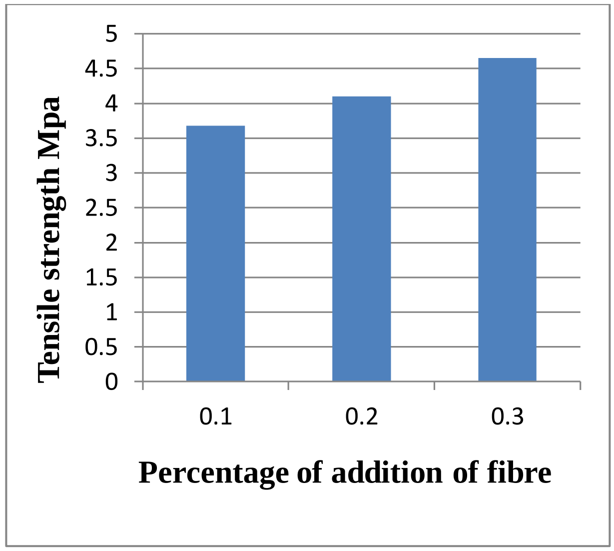

Figure No 7: Tensile strength in 7 days with addition of fibre

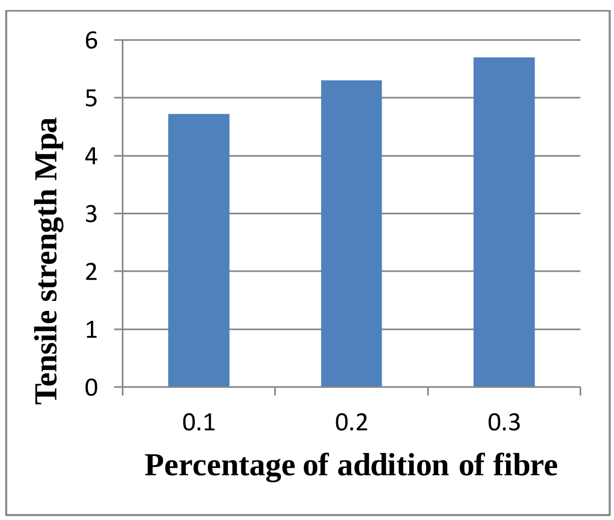

Figure No 8: Tensile strength in 28 days with addition of fibre

C. Flexural strength:

The influence of fibre content on the modulus of rupture for all types of fibre reinforced pervious concrete specimens is presented in Figure 11&12. Results demonstrate that all concretespecimens exhibited considerable increase in flexural strength with increasing fibre content. The modulus of rupture trend for carbon fibre varies as the volume fraction of fibre is increased. It is found that, the modulus of rupture increases as the fibre volumefraction isincreased. The concrete specimens containing no fibres are cracked and failed in a brittlemanner when strain in concrete reached its ultimate value. However, fibre reinforced concrete also cracked at ultimate strain, but the section is still capable to carry the load well after the initiation of the first crack.

Flexural strength without addition of fibre:

Curing Days	Flexural strengthN/mm^2
7	1.9
28	2.8

Table 5: Flexural strength without addition of fibre:

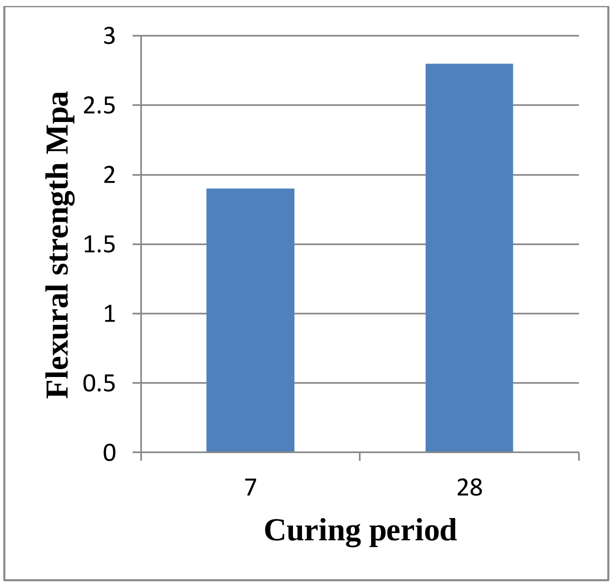

Figure No 9: Flexural strength for without addition of fibre

Figure No:10 Flexural test on prism

Flexural strength without addition of fibre:

Curing Days	**Flexural strength N/mm^2**		
	0.1 %	0.2 %	0.3%
7	2.1	2.4	2.9
28	2.7	3.1	3.5

Table 6: Result of Flexural strength with addition of fibre.

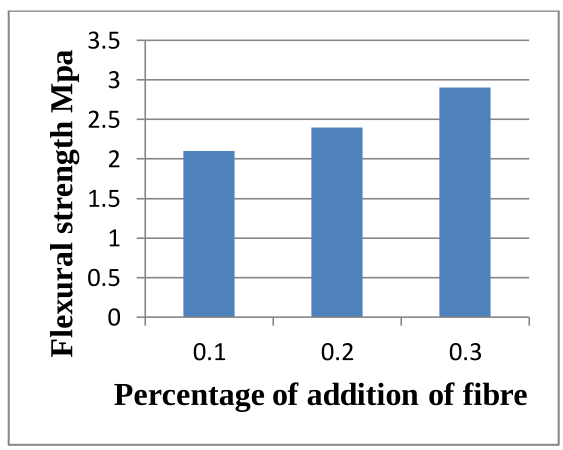

Figure No 11: Flexural strength in 7 days with addition of fibre

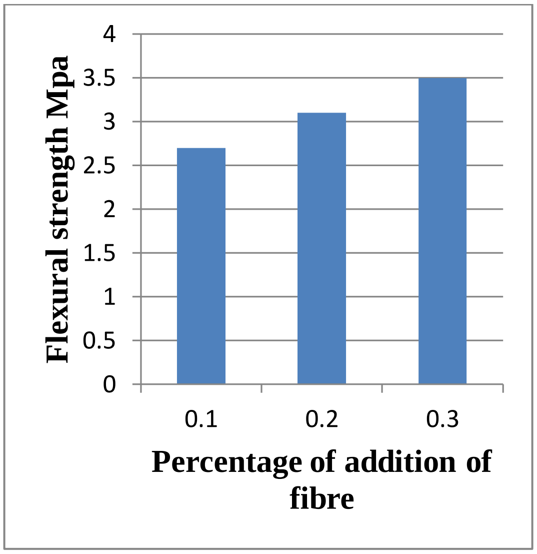

Figure No 12: Flexural strength in 28 days with addition of fibre

VI. CONCLUSION

From the experimental study following conclusions wereobtained:

1. Compressive strength of specimens for 1:4 ratio with polypropylene fibre increased by 27.6% when 0.2% addition of fibre at 28 days compared with control specimens.
2. Tensile strength of specimens for 1:4ratio with polypropylene fibre increased by 26.2%

When 0.3% addition of fibreat 28 days compared with control specimens.

3. Flexural strength of specimens for 1:4 ratio with polypropylenefibre increased by 25% when 0.3 % addition of fibre 6.45% at 28 days when compared with control specimens.

REFERENCE

[1] Hussam A. A. Rehman, "Some Properties of Fibre Reinforced No Fine Concrete", Al-Qadisiya Journal For Engineering Sciences, Vol. 5, No. 4, 439-450, Year 2012.

[2] A.B.Khemalapure, Prof.A.R.Vasatkar "An Experimental Analysis on Strength of Pervious Concrete With Partial Addition of Glass Fibre and Polypropylene Fibre", International Journal of Advance Engineering and Research Development Volume 3,Issue 7,July -2016.

[3] KetanBrijeshJibhenkar, V.D Vaidya, S. S Waghmare, Dr D.P Singh, "Experimental Investigation of Pervious Concreteusing Titanium Dioxide", Vol-1 Issue-1 2015

[4] C. Manoj Kumaar, U.K. Mark Vivin Raj and D. Mahadevan, "Effect of Titanium di-oxide in Pervious Concrete", International Journal of ChemTech Research CODEN (USA): IJCRGG ISSN: 0974-4290 Vol.8, No.8, pp 183-187 2015.

[5] NaliniThakre, Hirendra Rajput, Jaya Saxena, Harish Mitangale, "Comparative Study on Strength and Permeability of Pervious Concrete by Using Nylon and Polypropylene Fibre", IJCAT International Journal of Computing and Technology, Volume 1, Issue 4, May 2014